**TOPICS IN GERIATRICS: Diabetic peripheral neuropathy as a fall risk in the elderly**

Diabetic peripheral neuropathy is a common condition in older adults that has been shown to be a major fall risk. It is important that we understand the condition and how to best manage a patient in order to prevent falls and avoid injuries.

**LEARNING OBJECTIVES ARE TO:**

1. Understand the prevalence of diabetic peripheral neuropathy in older adults
2. Understand how diabetic peripheral neuropathy can affect one’s balance
3. Know how to recognize impairments from diabetic neuropathy during exam
4. Learn treatments to decrease fall risk in this population

**INFORMATION ABOUT THE TOPIC:**

According to the CDC, approximately 29.1 million people have diabetes in the United States which is 9.3% of our total population. In regards to older adults it was found that 25.8% of Americans over the age of 65 have diabetes. Given this high prevalence it is important to understand the effects that diabetes can have while treating older adults. In adults with diabetes, a prolonged exposure to high blood sugar can cause damage to nerve fibers. This can cause motor and sensory impairments for an individual with a history of diabetes. This is referred to as diabetic peripheral neuropathy (DPN) and it can be found in nearly 50% of people with diabetes. (Dyck et al, 1993)

In order to understand how this can lead to falls, a basic understand of the components of balance is necessary. Three different systems are utilized to maintain balance in a healthy adult. They are the somatosensory, vestibular, and visual systems. These 3 systems work together to elicit appropriate automatic and anticipatory reactions to keep a person upright. If one or more of these systems is impaired it can effect balance and lead to falls. In DPN somatosensation of the foot is impaired, decreasing its’ ability to sense the ground you stand on. This, in combination with weakness due to motor loss to the foot and ankle, can lead to decreased postural reactions and altered gait patterns. (Mueller et al, 1994)

**GUIDE FOR PATIENT MANAGEMENT:**

A comprehensive evaluation is necessary in order to recognize patients with DPN that may be at risk for falls. A past medical history of diabetes is important to recognize given the prevalence discussed earlier. According to the mayo clinic, signs and symptoms to look out for during examination are decreased two-point discrimination as well as decreased pain and temperature sensation of the foot. Also inspect for muscle weakness and decreased reflexes of the lower extremity. During the subjective portion of your examination pay close attention to reports of tingling or burning sensations in the foot or multiple falls in their recent history. Fall risk assessments can also be performed to assess risk in people in this population. A study performed by Jernigan et al in 2012 showed that the DGI and TUG were found to have the most diagnostic accuracy when trying to discriminate fallers from non-fallers in those with DPN and would thus be useful during your evaluation.

Multiple studies have been done to identify appropriate intervention strategies for this population. One systematic review found that lower extremity strengthening and balance exercises were both safe and effective for reducing falls. (Tofthagen,2012) Improving lower extremity strength in an older adult will help with postural reactions during any loss of balance. It also stands to reason that if you can improve vestibular system function through balance exercises that it will help make up for the decrease in somatosensation as well as visual loss that is common in older adults in order to improve balance and decrease falls. In this population it is important to keep in mind that decreased somatosensation can lead to diabetic foot ulcers. Therefore any exercise program should include education of regular foot checks to avoid this complication. One study, however, did show that weight bearing activity did not lead to significant increases in foot ulcers and that weight-bearing activity can be considered following adequate assessment and counseling of patients with DPN. (Lemaster et al, 2008) With this knowledge we can recommend continued weight bearing activities which can decrease muscle weakness and train the vestibular system to decrease falls in the older adult. We can also recommend a strengthening and balance program that could be performed at home or at a local gym.

**REFERENCES:**

Dyck PJ, Kratz KM, Kames JL, et al. The prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population-based cohort: the Rochester Diabetic Neuropathy Study. Neurology. 1993;43:817-824.

Mueller MJ, Minor SD, Sahrmann SA, et al. Differences in the gait characteristics of patients with diabetes and peripheral neuropathy compared with age-matched controls. Phys Ther. 1994;74:299 -308; discussion 309-213.

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Tofthagen C, Visovsky C, Berry D, et al. Strength and Balance Training for Adults with Peripheral Neuropathy and High Risk of Fall: Current Evidence and Implications for Future Research. ONCOL NURS FORUM, Sep2012; 39(5) 416-424

# [Lemaster JW](http://www.ncbi.nlm.nih.gov/pubmed/?term=Lemaster%20JW%5BAuthor%5D&cauthor=true&cauthor_uid=18801859), [Mueller MJ](http://www.ncbi.nlm.nih.gov/pubmed/?term=Mueller%20MJ%5BAuthor%5D&cauthor=true&cauthor_uid=18801859), [Reiber GE](http://www.ncbi.nlm.nih.gov/pubmed/?term=Reiber%20GE%5BAuthor%5D&cauthor=true&cauthor_uid=18801859), [Mehr DR](http://www.ncbi.nlm.nih.gov/pubmed/?term=Mehr%20DR%5BAuthor%5D&cauthor=true&cauthor_uid=18801859), [Madsen RW](http://www.ncbi.nlm.nih.gov/pubmed/?term=Madsen%20RW%5BAuthor%5D&cauthor=true&cauthor_uid=18801859), [Conn VS](http://www.ncbi.nlm.nih.gov/pubmed/?term=Conn%20VS%5BAuthor%5D&cauthor=true&cauthor_uid=18801859). Effect of weight-bearing activity on foot ulcer incidence in people with diabetic peripheral neuropathy: feet first randomized controlled trial. [Phys Ther.](http://www.ncbi.nlm.nih.gov/pubmed/18801859) 2008 Nov;88(11):1385-98.

**ADDITIONAL RESOURCES:**

Basics of condition: <http://www.mayoclinic.org/diseases-conditions/diabetic-neuropathy/>

Statistics of condition: <http://www.diabetes.org/diabetes-basics/statistics/>

Leg strengthening exercises: <http://eldergym.com/leg-exercises.html>

Balance exercises: [http://eldergym.com/elderly balance.html](http://eldergym.com/elderly%20balance.html)

Important facts about falls: <http://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html>